REMARKS/ARGUMENTS

Claims 1-10, 24, 25 and 26-33 are active. The Abstract has been abridged. A new Title based on claim 1 has been added. Claims 8 and 31 have been revised for clarity. The further limitation of claim 31 finds support on line 30 of page 7. No new matter has been added.

Restriction/Election

The Applicants previously elected without traverse **Group I**, claims 1-10 and 24-25, drawn to a lithium battery separator having a shutdown function. Claims 11-22, drawn to a process for producing a separator were withdrawn from consideration and have been cancelled. The Applicants respectfully request that claims directed to any nonelected subject matter which depend from or otherwise include all the limitations of an allowed elected claim, be rejoined upon an indication of allowability for the elected claim, see MPEP 821.04.

Objection—Abstract

The Abstract has been abridged to 146 words. Thus, this objection is now moot.

Objection—Title

The Title has been revised. Thus, this objection is now moot.

Objection—Claim

The objection to claim 31 is moot in view of the amendment above.

Rejection—35 U.S.C. §112, first paragraph

Claims 27-28 were rejected under 35 U.S.C. 112, first paragraph, as being lacking adequate written description. This issue is moot in view of the amendment of claim 28. "Ceramic" coatings are expressly described on page 6, line 25 of the specification.

The Applicants respectfully traverse the rejection of claim 27. The specification broadly contemplates shutdown particles that "melt at a predetermined temperature" (page 3, line 20. Moreover, shutdown particles melting at 120°C to 150°C are exemplified at least in Examples 3 and 4 (pages 23-24) of the specification. Thus, this range is one that one skilled in the art would have consider inherently supported by the discussion in the original disclosure", MPEP 2163.05(III). In view of the broad as well as specific disclosure in the present specification, it would have been clear to one of skill in the art at the time of invention that the inventors possessed the subject matter claimed in claim 27. Accordingly, the Applicants respectfully request withdrawal of this rejection.

Rejection—35 U.S.C. §103(a)

Claims 1-8, 10, and 24-25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Bauer, et al., U.S. Patent No. 6,632,561, in view of Hying, et al., WO 99/62620 (corr. to U.S. Patent No. 6,620,320). The Applicants incorporate their prior arguments by reference to their last response and answer the Examiner's new argument below.

Response to Arguments:

The Examiner points out the well-known difference between ion-conducting materials and electron-conducting ("electroconductive") materials. The former permits ions, such as cations or anions (e.g., H^+/protons, Na^+, Mg^{2+} or OH^- or Cl^-), while the latter permits conduction of electrons (e^-).

Hying was cited as a secondary reference in the rejection to teach an element missing from the primary reference Bauer: "a porous carrier comprising a porous inorganic, **nonelectroconductive coating layer** that is bonded to a shutdown layer comprising meltable shutdown particles" as required by claim 1.

The Examiner agrees that Hying refers to ion-conducting materials, but speculates that Hying must teach a non-electroconductive coating as well, "because the fuel cell would short circuit" (OA, page 8, second to last line) if its membrane conducted electrons. However, this assumption is not necessarily correct and the Examiner has not provide sufficient technical reasons for asserting that the membrane point to in Example 2.2 (col. 13) of Hying is non-electroconductive. Fuel cell membranes may be both electron- and ion-conducting as shown by U.S. Patent No. 6,468,684 (attached, see abstract):

> A solid acid material is used as a proton conducting membrane in an electrochemical device. The solid acid material can be one of a plurality of different kinds of materials. A binder can be added, and that binder can be either a nonconducting or a conducting binder. Nonconducting binders can be, for example, a polymer or a glass. **A conducting binder enables the device to be both proton conducting and electron conducting**. The solid acid material has the general form $M_aH_b(XO_t)_c$. (emphasis added)

Moreover, the Applicants disagree with the Examiner's technical reasoning that metal compounds, such as oxides, are necessarily "insulators (non-electroconductive)" (OA, page 9, line 4). As shown by WO98/025995 "PROCESS FOR IMPROVING ADHESION OF **ELECTROCONDUCTIVE METAL OXIDE LAYERS** TO POLYMERIC SUBSTRATES AND ARTICLES PRODUCED THEREBY" metal compounds, such as oxides are electroconductive:

> Materials which may comprise the electrochromic film include transition metal hydroxides and metal oxides such as tungsten oxide, molybdenum oxide, niobium oxide, vanadium oxide, titanium oxide, copper oxide, bismuth oxide, lead oxide, chromium oxide, rhodium oxide, cobalt oxide, manganese oxide, praseodymium oxide, ruthenium hydroxide, nickel oxide, osmium hydroxide and iridium oxide. The preferred metal oxides are tungsten oxide and iridium oxide. A more preferred iridium oxide is

the nitrogen-containing iridium oxide described in U.S. Patent 5,520,851, which is incorporated herein by reference.

Furthermore, Hying differs from the invention and is non-analagous art for the following reasons. The present invention provides separators which have a suitable *shutdown mechanism* and with which meltdown of the *battery cell* can be prevented at the same time (specification, page 3, lines 3 – 5). However, Hying does not disclose either the use of ceramic separators in batteries or equipment with a shutdown mechanism.

In fuel cells, on the other hand, it is an important function of the membrane to hinder hydrogen atoms to be permeated, and to hinder CO molecules deteriorate the function of catalysts used therein. This is far away and quite distinct from any battery or lithium ion battery cell chemistry.

Therefore, Hying provided no hint or suggestion to one or ordinary person skilled in the art of *battery cells* about how to solve the object of the present application in the light of membranes of *fuel cells*, nor any mechanism is made obvious which shuts the pores of a membrane by melting particles of a particle layer at a desired temperature in case of undesired temperature increasement, e.g. Hying does not even make obvious any mechanism providing temperature dependent porosity as is creatively realised by reducing the pore size when melting of particles begins until plug up the membrane pores when all particles have molten. Thus, a person of ordinary skill in the art would not have even taken Hying into account when looking for a solution of the object if the present application.

In view of the above remarks, the Applicants maintain the Hying does not disclose or suggest the element missing from the primary reference, namely, "a porous carrier having an inorganic, **non-electroconductive** coating". Since neither prior art document discloses this element of the invention, or suggests the particular combination of elements of the invention, this rejection should be withdrawn.

Rejection—35 U.S.C. §103(a)

Claim 9[1] was rejected under 35 U.S.C. §103(a) as being unpatentable over Bauer, et al., U.S. Patent No. 6,632,561, in view of Hying, et al., WO 99/62620 as applied to claims 1-8, 10 and 24-25, and further in view of Treger, et al., U.S. Patent No. 5,091,272. The primary references have been discussed above and Treger was cited as teachings the thickness of the shutdown layer required by claim 9. However, Treger does not remedy the deficits of the two primary references as discussed above, thus this ground of rejection may also be withdrawn.

[1] Claims 29, 32 and 33 are also discussed in the body of the rejection.

Conclusion

In view of the amendments and remarks above, the Applicants respectfully submit that this application is now in condition for allowance. An early notice to that effect is earnestly solicited.

Respectfully submitted,

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